

Name

Key

Date

202 2.6 Extra Practice

State the reason why the following statements are true.

1. Addition If $AB = BC$, then $AB + OR = BC + OR$.
2. Subtraction If $AB = BC$, then $AB - OR = BC - OR$.
3. Addition If $5x - 7 = 23$, then $5x = 30$.
4. Addition If $y - 19 = 21$, then $y = 40$.
5. Division If $7x = 91$, then $x = 13$.
6. Division If $49 = 147x$, then $1/3 = x$.
7. Subtraction If $2x + 6 = x - 2$, then $x + 6 = -2$.
8. Multiplication If $m\angle A = 40$, then $3 \cdot m\angle A = 120$.
9. Transitive If $m\angle A = m\angle B$ and $m\angle B = m\angle C$, then $m\angle A = m\angle C$.
10. Substitution If $\frac{1}{2} WY = \frac{1}{2} RT$, and $RS = \frac{1}{2} RT$, and $WS = \frac{1}{2} (WY)$, then $WS = RS$.
11. Multiplication If $m\angle 2 = m\angle 1$, then $5 \cdot m\angle 2 = 5 \cdot m\angle 1$.
12. Addition If $AB = CD$, then $AB + BC = BC + CD$.
13. Substitution If $m\angle 1 + m\angle 2 = 180$ and $m\angle 1 = m\angle 3$, then $m\angle 3 + m\angle 2 = 180$.
14. Transitive If $m\angle 4 = m\angle 3$, and $m\angle 3 = m\angle 5$, and $m\angle 5 = m\angle 1$, then, $m\angle 4 = m\angle 1$.
15. Substitution If $m\angle 5 + m\angle 6 = 90$ and $m\angle 6 = m\angle 3$, then $m\angle 5 + m\angle 3 = 90$.
16. Substitution If $\frac{1}{2} AB = \frac{1}{2} CD$, and $EF = \frac{1}{2} AB$, then $EF = \frac{1}{2} CD$.
17. Transitive If $m\angle ABC = m\angle 1$ and $m\angle 1 = m\angle GHK$, then $m\angle ABC = m\angle GHK$.
18. Symmetric If $RS = DW$, then $DW = RS$.
19. Reflexive $AC = AC$.
20. Reflexive $m\angle D = m\angle D$.

Possible Reasons:

Addition,
Subtraction,
Multiplication,
Distributive,
Reflexive,
Symmetric,
Transitive,
Substitution,
Division,
Def. of midpoint,
Def. of \angle bisector

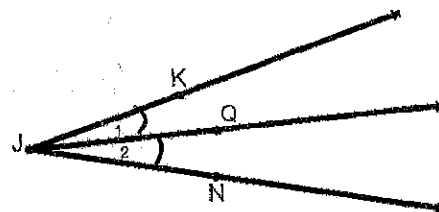
21. Transitive If $m\angle A = m\angle D$ and $m\angle D = m\angle E$, then $m\angle A = m\angle E$
22. Transitive If $CE = BA$ and $BA = \frac{1}{2}(BD)$, then $CE = \frac{1}{2}(BD)$
23. Symmetric If $WR = PQ + 2ST$, then $PQ + 2ST = WR$.
24. Substitution If $AB + BC = BC + CD$, and $AC = AB + BC$, and $BD = BC + CD$, then $AC = BD$.
25. Substitution If $m\angle 4 + m\angle 5 = 90$ and $m\angle 3 = m\angle 4$, then $m\angle 3 + m\angle 5 = 90$.

State the conclusion that can be drawn from the given information. Give the reason for each conclusion.

1. Given: \overline{JQ} bisects $\angle KJN$.

Conclusion: $\angle 1 \cong \angle 2$

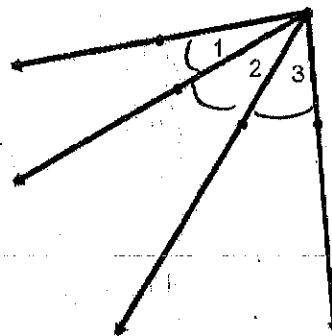
Reason: def of \angle bisector



2. Given: $m\angle 1 = m\angle 2$; $m\angle 2 = m\angle 3$

Conclusion: $m\angle 1 = m\angle 3$

Reason: Transitive



3. Given: M is the midpoint of \overline{AB} .

Conclusion: $AM = MB$

Reason: def of midpt.



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Skills Practice

Algebraic Proof

State the property that justifies each statement.

1. If $80 = m\angle A$, then $m\angle A = 80$. Symmetric

2. If $RS = TU$ and $TU = YP$, then $RS = YP$. Transitive

3. If $7x = 28$, then $x = 4$. Division

4. If $VR + TY = EN + TY$, then $VR = EN$. Subtraction

5. If $m\angle 1 = 30$ and $m\angle 1 = m\angle 2$, then $m\angle 2 = 30$. Substitution

Complete the following proof.

6. Given: $8x - 5 = 2x + 1$

Prove: $x = 1$

Proof:

Statements

Reasons

a. $8x - 5 = 2x + 1$

a. Given

b. $8x - 5 - 2x = 2x + 1 - 2x$

b. Subtraction

c. $6x - 5 = 1$

c. Substitution Property

d. $6x - 5 + 5 = 1 + 5$

d. Addition Property

e. $6x = 6$

e. Substitution

f. $\frac{6x}{6} = \frac{6}{6}$

f. Division

g. $x = 1$

g. Substitution

State the property that justifies each statement.

1. If $m\angle 1 = m\angle 2$, then $m\angle 2 = m\angle 1$. Symmetric

2. If $m\angle 1 = 90$ and $m\angle 2 = m\angle 1$, then $m\angle 2 = 90$. Substitution

3. If $AB = RS$ and $RS = WY$, then $AB = WY$. Transitive

4. If $AB = CD$, then $\frac{1}{2}AB = \frac{1}{2}CD$. Multiplication

5. If $m\angle 1 + m\angle 2 = 110$ and $m\angle 2 = m\angle 3$, then $m\angle 1 + m\angle 3 = 110$. Substitution

6. $RS = RS$ Reflexive

7. If $AB = RS$ and $TU = WY$, then $AB + TU = RS + WY$. Addition

8. If $m\angle 1 = m\angle 2$ and $m\angle 2 = m\angle 3$, then $m\angle 1 = m\angle 3$. Transitive

9. A formula for the area of a triangle is $A = \frac{1}{2}bh$. Prove that bh is equal to 2 times the area of the triangle.

2-6

Reading to Learn Mathematics

Algebraic Proof

Pre-Activity How is mathematical evidence similar to evidence in law?

Read the introduction to Lesson 2-6 at the top of page 94 in your textbook.

What are some of the things that lawyers might use in presenting their closing arguments to a trial jury in addition to evidence gathered prior to the trial and testimony heard during the trial?

Reading the Lesson

1. Name the property illustrated by each statement.

a. If $a = 4.75$ and $4.75 = b$, then $a = b$. Transitive

b. If $x = y$, then $x + 8 = y + 8$. Addition

c. $5(12 + 19) = 5 \cdot 12 + 5 \cdot 19$. Distributive

d. If $x = 5$, then x may be replaced with 5 in any equation or expression. Substitution

e. If $x = y$, then $8x = 8y$. Multiplication

f. If $x = 23.45$, then $23.45 = x$. Symmetric

g. If $5x = 7$, then $x = \frac{7}{5}$. Division

h. If $x = 12$, then $x - 3 = 9$. Subtraction

2. Give the reason for each statement in the following two-column proof.

Given: $5(n - 3) = 4(2n - 7) - 14$

Prove: $n = 9$

Statements

Reasons

1. $5(n - 3) = 4(2n - 7) - 14$

1. Given

2. $5n - 15 = 8n - 28 - 14$

2. Distributive

3. $5n - 15 = 8n - 42$

3. Substitution

4. $5n - 15 + 15 = 8n - 42 + 15$

4. Addition

5. $5n = 8n - 27$

5. Substitution

6. $5n - 8n = 8n - 27 - 8n$

6. Subtraction

7. $-3n = -27$

7. Substitution

8. $\frac{-3n}{-3} = \frac{-27}{-3}$

8. Division

9. $n = 9$

9. Substitution

Helping You Remember

3. A good way to remember mathematical terms is to relate them to words you already know. Give an everyday word that is related in meaning to the mathematical term *reflexive* and explain how this word can help you to remember the Reflexive Property and to distinguish it from the Symmetric and Transitive Properties.